THE RELATIONSHIP OF QUELEA MIGRATIONS TO CEREAL CROP DAMAGE IN THE LAKE CHAD BASIN

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ABSTRACT: Quelea quelea and some other species of weaverbirds (Ploceidae) cause severe damage to cereal crops in sahelian zones of Africa. Recent observations of weaverbird damage to cereals in the Lake Chad Basin show that crops grown in certain places at particular times are more likely to be damaged than others. Timing of harvest by varying planting times and selection of short-cycle cereals may avoid damage in some situations.

INTRODUCTION

Quelea quelea is the most important avian pest of cereals in the sahelian zones of Africa. Quelea* pose a serious problem to the development and expansion of mechanized cereal schemes. Unlike the traditional farmers whose main concern is the total amount that he harvests, operators of large-scale schemes are very aware of the percent of damage that pests cause. In underdeveloped countries, production costs such as equipment, fuels, fertilizers, and transport may be very high, and in consequence, the profit margin low. Investment capital to develop these schemes must often be borrowed and the interest paid further cuts into profits. Where birds regularly cause damage, even if only a small percentage, they can be the deciding factor between economic success and failure (Jackson, 1973).

Quelea is an extremely difficult pest to control because of its enormous numbers, high reproductive potential, and the vast, often inaccessible range that it occupies. The main thrust of African bird control organizations in the past has been to try to reduce Quelea numbers with avicides and explosives. In most instances the benefits of this kind of control are probably low in relation to the costs.

Quelea are not usually dependent upon cereal crops for food. In fact, there are often periods when Quelea ignore crops or cause only negligible damage. They prefer the small seeds of wild grasses (Ward, 1965) and when their preferred foods are available in abundance, they do not attack cereals. When preferred seeds are unavailable, damage is likely to occur if Quelea are nearby.

The knowledge of food shortage periods and an understanding of Quelea migrations are important keys to predicting crop damage. The ability to predict damage will in some cases allow the reduction of crop losses. In this preliminary report of some of the relationships between ecological factors and crop damage in the Lake Chad Basin, some locations where agricultural schemes may reduce crop damage by timely harvesting are identified.

QUELEA MIGRATIONS IN THE LAKE CHAD BASIN

The following description of migration patterns of Quelea in the Lake Chad Basin summarizes data gathered between 1971 and the present. Surveys were conducted in north Cameroon and western Chad at intervals of several weeks. During each survey, an attempt was made to determine the northern and southern limits of the population as well as the location of major concentrations of Quelea.

Dry Season Movements

At the end of the nesting season in late October or early November, Quelea were widely distributed throughout their range. The heaviest concentrations were found between 11° and 13° N. Following their abandonment of nesting colonies, adult Quelea became increasingly rare in this area but increased in abundance near the southern limit of their range between 8° 30' and 9° 30' N in the following months. This indicated a southward migration. The movement to the south was not complete, however, and some Quelea, mainly young of the year, could be found throughout the study area. The corresponding decrease in numbers of Quelea

* The generic name Quelea is used as the common name to denote the Red-billed (or Sudan) Dioch, Quelea quelea.

in the northern part of their range was more apparent in 1972 and 1973 than in 1971 when large numbers of Quelea did remain in the vicinity of 12° N until the rains began.

Rainy Season Movements

When the rains began in the south in April the small seeds of annual grasses which are the preferred food of Quelea germinated, and Quelea evacuated the southern part of their range and moved north. Note the rise in the line indicating the southern limit of the population in Figure 1. Most of the population moved to the area just south of Lake Chad (about 12° N) and remained there until again overtaken by the rains and food shortage. At this time the birds left this area and moved back south to places where they found grasses bearing seed. Grass growth does not develop evenly during the rainy season due to scattered areas of heavier rainfall interspersed with some relatively dry areas, so some birds had to move only a short distance (perhaps 200 km) before finding suitable food.

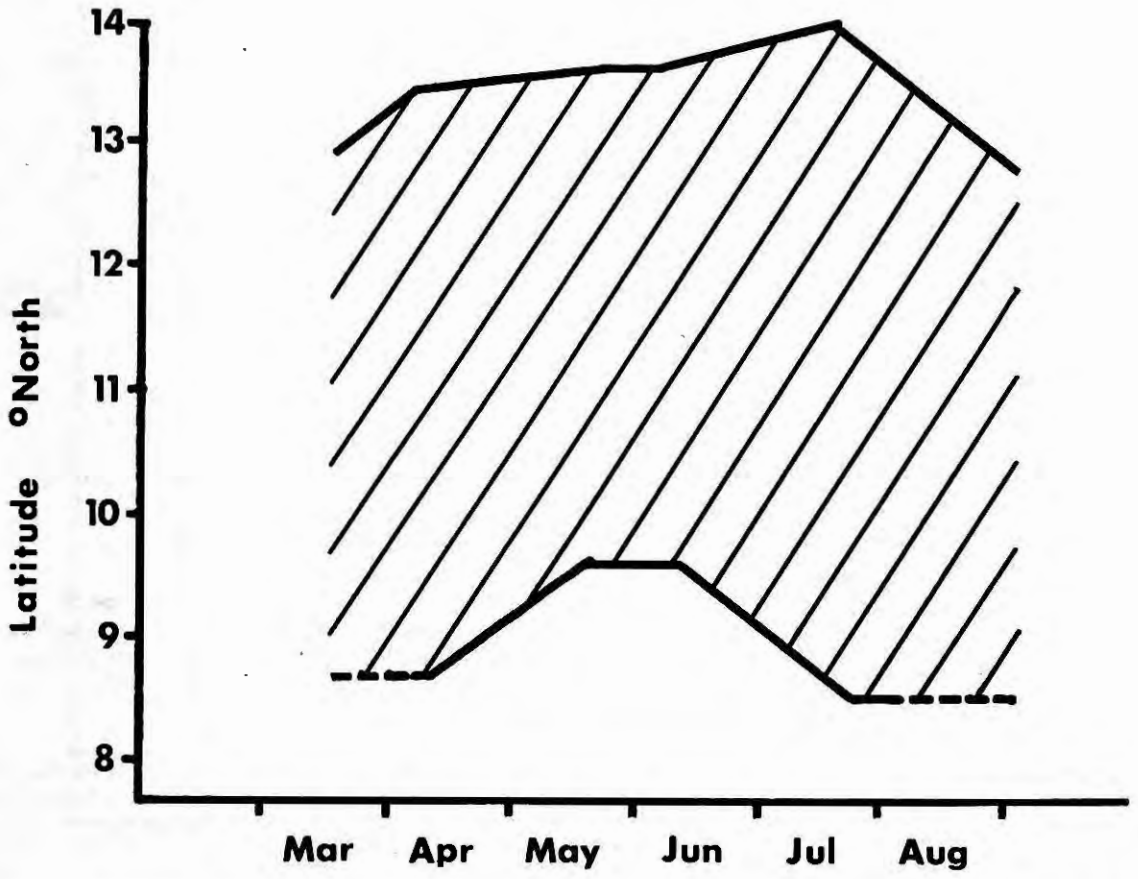

Figure 1. Seasonal change in the northern and southern limits of Quelea quelea populations in west Chad and north Cameroon. Data are from 1973.

Nesting Season Movements

As grasses in the northern zones matured, the Quelea again moved north prior to nesting in August or September. Nesting started earliest in the southern part of the range, and latest, usually in September, between 11° and 13° N where most colonies were found. The severe drought in 1973 caused Quelea which had started to build nests at 13° N in Chad to abandon these sites.

General Remarks

I would like to emphasize that this simplified account of Quelea migrations describes how most members of the population moved. There were some areas where small groups of birds appeared to be resident or nearly so. Such groups were observed along the southern shores of Lake Chad where shifting margins of the lake always provided some grass in a suitable stage to yield seeds. Also, during the dry season isolated individuals or small groups of Quelea might be found considerably further south than observed.

Ward's (1971) account of Quelea migration in the Lake Chad zone differs primarily in the details of the rainy season movement and does not mention the movement of some birds to the south in the late dry season. Quelea move down to at least 8° 30' N, which is considerably further south of Ward's estimate of 10° N. It is possible that the differences in these two accounts are due to the much greater rainfall in the early 1960's when Ward did his work. The weather of the last few years has been characterized by severe drought, particularly at the northern limit of the Quelea's range.

FOOD SHORTAGES ARE CORRELATED WITH CROP DAMAGE

In the simplified pattern of migration described above, there are two periods when seeds are difficult for Quelea to find (Ward, 1971): first, during the early rains when seeds are germinating and thus influencing the northward migrations, and second, during the early dry season when seeds are abundant on the surface of the soil but still hidden by grass stalks which are as yet unburned.

Early Rains

Food shortages during the northward migration do not usually result in damage to native crops because very few remain unharvested at this time. New irrigated cereal schemes such as those now developing in the Lake Chad Basin are likely to be attacked if crops in vulnerable stages are intercepted by hungry Quelea moving north. In 1973 this damage was illustrated by Quelea depredation at two irrigated rice schemes on opposite sides of the Logone River located about 10° N. One scheme at Bongor, Chad, was harvested in mid-May and received moderate damage. The other scheme at Yagoua, Cameroon, matured later and received very heavy damage before the grain was ready for harvest in late June. This heavier damage was correlated with the germination of wild seeds resulting in a food shortage (L. Bortoli,* personal communication). In addition, the number of birds doing damage at Yagoua was greater than at Bongor because of the continuing buildup of northbound migrants.

Because the northward migration of Quelea is predictable except in years of unusual weather conditions, the schemes at Bongor and Yagoua will probably be visited by Quelea every year in May and June. If rice at these schemes can be harvested before the birds arrive, either by early planting or by using short-cycle varieties, the percentage of Quelea damage will be reduced.

Early Dry Season

Damage during this second period of food shortage is well known to native peoples. Millet, rice, and sorghum are attacked usually between November and January. In many cases young birds cause most of the damage. Perhaps this is because they are less adept than adults at finding preferred foods and also because adults seem more mobile at this time and may find food at greater distances from the colony sites.

Since early dry-season damage is widespread, no good control short of destroying all Quelea in a large crop area can be proposed at this time. Such a strategy was proposed by Ward (1972) but is of doubtful value except in specialized situations. Synchronous planting of some very large schemes might dilute early season damage.

OTHER GRANIVOROUS SPECIES MAY FOLLOW PREDICTABLE MIGRATION PATTERNS

Seasonal trends in bird numbers were observed at a plant breeding station at Deli, Chad, in 1973. Birds feeding in experimental sorghum plots or resting nearby were counted during a three-hour period three days a week and weekly estimates of granivorous bird mass were made. Biomass figures were obtained by multiplying the number of each species seen feeding by mean body weight of that species. Figure 2 shows relative change in bird biomass at the experimental plots and in the immediate vicinity. Planting dates were staggered so that equal amounts, about one-third hectare, were in a vulnerable stage throughout the bird damage period.

* Western Zone, FAO Regional Quelea Project; Dakar, Senegal. This information is contained in technical reports of the FAO Regional Quelea Project. These reports are not intended for open circulation, however, and information is cited here as a personal communication.

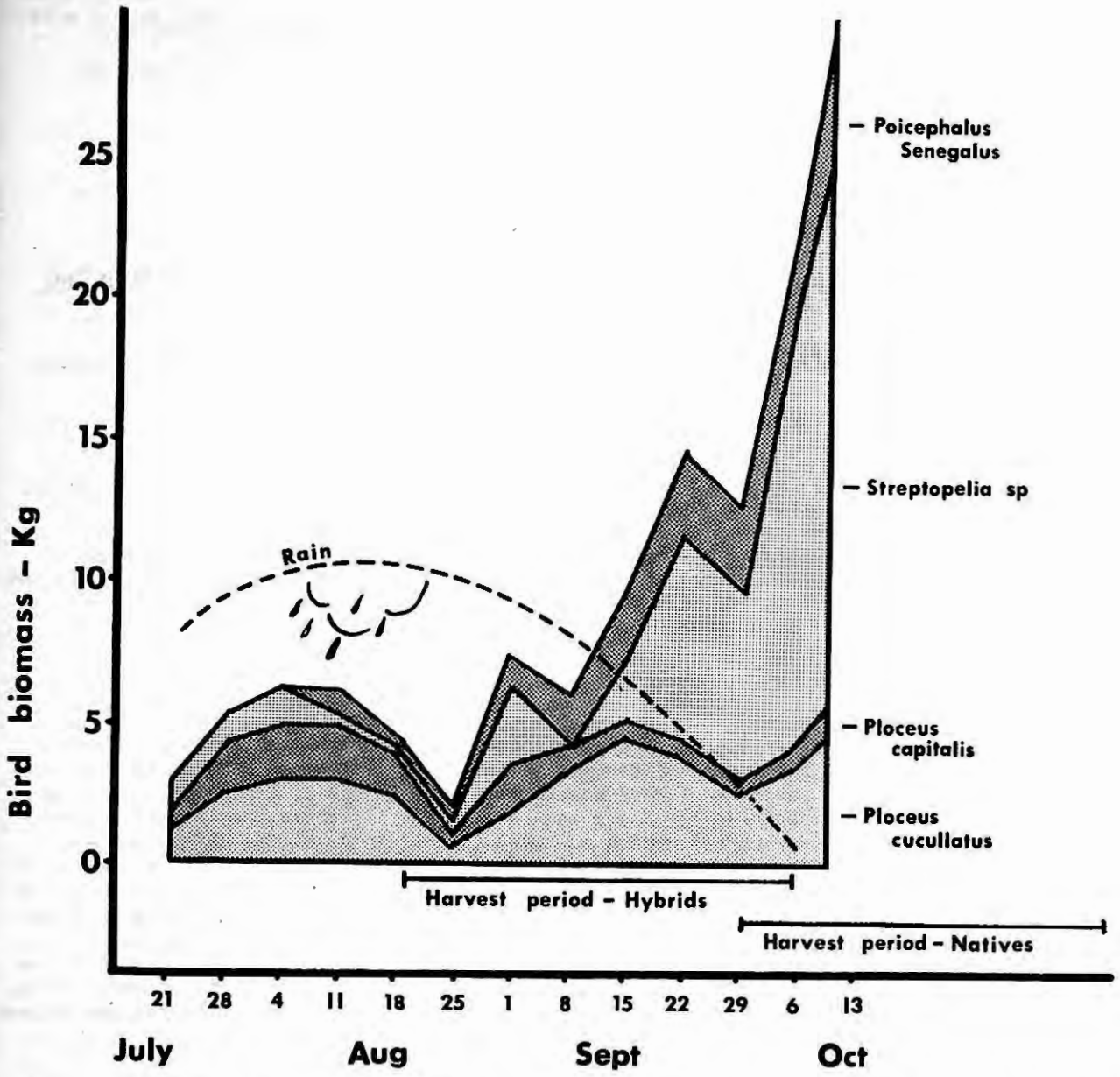

Figure 2. Seasonal change in biomass of granivorous birds at experimental sorghum plots at Deli, Chad, 1973. Biomass equals number of birds of each species x mean weight in grams.

Greatest numbers of granivorous birds appeared late in the sorghum harvest season and late-maturing varieties were exposed to the depredations of these birds. If this pattern proves to be consistent from year to year, short-cycle sorghums could avoid much damage by permitting an early harvest. A very early harvest during August would not be practical in this situation because of the problem of rain and resultant molding of ripe grain which would occur if the grain matured too early.

CONCLUSIONS

Relationships between weather, plant growth, food availability, and migrations of Quelea and other granivorous birds are keys to predicting crop damage. In some cases this knowledge can be used to avoid crop damage by timely planting and harvest. When large-scale cereal schemes are being planned for Africa, preliminary investigations of ecological factors should be made. If severe damage is likely and no way can be found to avoid it, implementation of some schemes might best be delayed or better sites selected if a practical means of crop protection cannot be found.

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